IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS

Mitutoyo Corporation, Mitutoyo America Corporation and C.E. Johansson AB, Plaintiffs, v. Central Purchasing, Inc., Defendant.	JUDGE JOAN H. LEFKOW 03C 0990 MAGISTRATE JUDGE ASHMAN Civil Action No.

COMPLAINT WITH JURY DEMAND

Plaintiffs bring this action for patent infringement and breach of contract and allege as follows:

JURISDICTION AND VENUE

1. This is an action, in part, for patent infringement arising under the patent laws of the United States, Title 35 of the United States Code. This Court has jurisdiction over the patent infringement cause of action pursuant to 28 U.S.C. §1338(a). This Court has supplemental jurisdiction over the breach of contract cause of action pursuant to 28 U.S.C. §1367. Venue is proper in this district pursuant to 28 U.S.C. §1391(c) and §1400(b).

THE PARTIES

2. Plaintiff Mitutoyo Corporation ("Mitutoyo") is a corporation organized under the laws of the Japan and has a place of business at 20-1 Sakado 1-chome, Takatsu-ku, Kawasaki-shi, Kanagawa-ken 213, Japan.

3. Plaintiff Mitutoyo America Corporation ("MAC") is a corporation organized under the laws of New York, and has a place of business at 965 Corporate Boulevard, Aurora, Illinois 60504.

4. Plaintiff C.E. Johansson AB ("CEJ") is a corporation organized under the laws of Sweden and has a place of business at Frakgatan 6, Eskilstuna, Sweden.

5. On information and belief, defendant Central Purchasing, Inc. ("Central Purchasing") is a corporation organized under the laws of California, and has a place of business at 3491 Mission Oaks Boulevard, Camarillo, California 93012, and a retail outlet at 940 W. Dundee Road, Arlington Heights, Illinois.

THE PATENT-IN-SUIT

6. U.S. Patent No. 4,743,902 was duly and legally issued by the United States Patent and Trademark Office on May 10, 1988. A copy of U.S. Patent No. 4,743,902 is attached as Exhibit 1.

7. CEJ owns all rights, interest and title in U.S. Patent No. 4,743,902. Mitutoyo is the exclusive licensee under U.S. Patent No. 4,743,902 with respect to length measurement devices, which license includes all rights to bring suit for

infringement of U.S. Patent No. 4,743,902 by length measurement devices and all rights to collect damages for past infringement of U.S. Patent No. 4,743,902 by length measurement devices. MAC is the exclusive United States distributor of length measurement devices covered by the claims of U.S. Patent No. 4,743,902.

8. Plaintiffs have complied with the patent marking statute, 35 U.S.C. §287, and have also provided actual notice to Central Purchasing of its infringement pursuant to 35 U.S.C. §287.

COUNT I - PATENT INFRINGEMENT

9. Central Purchasing has been and continues to infringe U.S. Patent No. 4,743,902 by offering to sell, selling and/or importing, directly and/or through intermediaries, length measurement devices covered by one or more claims of U.S. Patent No. 4,743,902 in this district and throughout the United States, in violation of 35 U.S.C. §271, and will continue to infringe U.S. Patent No. 4,743,902 unless enjoined by this Court. Such infringing length measurement devices include, but are not necessarily limited to, the Cen-Tech 4", 6", 8" and 12" digital calipers (Item Nos. 47256-OVGA, 47257-3VGA, 47260-1VGA and 47261-OVGA, respectively).

10. The acts of infringement by Central Purchasing have occurred with full knowledge of U.S. Patent No. 4,743,902 and have been willful and deliberate, making this case exceptional within the meaning of the United States patent laws.

11. Plaintiffs are and have been damaged by Central Purchasing's infringement because plaintiffs have been deprived of their exclusive rights to exclude others from practicing the claimed invention and are entitled to compensation for this infringement, pursuant to 35 U.S.C. §284.

12. Central Purchasing previously sued CEJ and Mitutoyo for a declaratory judgment of patent invalidity and unenforceability with regard to U.S. Patent No. 4,743,902.

13. Specifically, Central Purchasing filed a Complaint for Declaratory Judgment of Patent Invalidity and Unenforceability on or about March 29, 1995 in the United States District Court for the Central District of California. This case was assigned Civil Action No. 95-2014 JGD (GHKX).

14. Central Purchasing filed a First Amended Complaint for Declaratory Judgment of Patent Invalidity or Unenforceability ("First Amended Complaint") on or about April 6, 1995. The First Amended Complaint is attached as Exhibit 2.

15. The First Amended Complaint asserted that the claims of U.S. Patent No. 4,743,902 were invalid and that U.S. Patent No. 4,743,902 was unenforceable.

16. The First Amended Complaint had four counts: Count I - Patent Invalidity Because of Unpatentability, Count II - Patent Invalidity Because of Uncontested Obviousness, Count III - Patent Unenforceability Because of Inequitable Conduct, and Count IV - Patent Unenforceability Because of Ambiguous Claim Language.

17. The First Amended Complaint sought judgment "declaring that the '902 patent and the claims thereof are invalid, void, and unenforceable."

18. This case was transferred from the United States District Court for the Central District of California to the United States District Court for the District of Columbia, and assigned Civil Action No. 95-2292 by the United States District Court for the District of Columbia.

19. On or about February 21, 1996, CEJ and Mitutoyo filed Defendants' Answer to Plaintiff's First Amended Complaint.

20. On or about March 15, 1996, Mitutoyo and CEJ filed (1) Defendants' Motion for Summary Judgment that Claims 1 and 2 of U.S. Patent No. 4,743,902 are not Invalid Under 35 U.S.C. §102, (2) Defendants' Motion for Summary Judgment Dismissing Count II of the Amended Complaint and (3) Defendants' Motion for Summary Judgment Dismissing Count III of the Amended Complaint.

21. On or about June 17, 1996, Central Purchasing filed (1) Plaintiff's Motion for Summary Judgment that Claims 1 and 2 of U.S. Patent No. 4,743,902 are Invalid Under 35 U.S.C. §102 and (2) Plaintiff's Cross-Motion for Summary Judgment on Count II of the Complaint Declaring Defendants' Patent Invalid.

22. During the pendency of these motions and on or about March 21, 1997, the parties filed a Stipulated Dismissal of Count III of the Amended Complaint after Central Purchasing took discovery with respects to the merits of Count III.

23. Count III of the First Amended Complaint was subsequently dismissed with prejudice. A copy of the April 17, 1997 Order dismissing Count III is attached as Exhibit 3.

24. On or about November 25, 1997, the United States District Court for the District of Columbia issued an Order (1) granting (a) Defendants' Motion for Summary Judgment that claims 1 and 2 of U.S. Patent No. 4,743,902 are not Invalid Under 35 U.S.C. §102 and (b) Defendants' Motion for Summary Judgment Dismissing Count II of the Amended Complaint, (2) denying (a) Plaintiff's Cross-Motion for Summary Judgment on Count II Declaring Defendants' Patent Invalid and (b) Plaintiff's Motion for Summary Judgment that Claims 1 and 2 of U.S. Patent 4,743,902 are Invalid under 35 U.S.C. §102 and (3) dismissing paragraphs 13(a)-(f) and 14 of Count I and Count II of the First Amended Complaint with prejudice. This Order is Exhibit 4 to this complaint.

25. On or about January 17, 1998, Central Purchasing filed a Motion to Dismiss the Remaining Claims Pursuant to Rule 41(a)(2), F.R. Civ. P.

26. On or about June 9, 1998, the Court granted the motion to dismiss the remaining claims, and all claims not resolved by the November 25, 1997 Order were dismissed by the Court with prejudice. A copy of this Order is attached as Exhibit 5.

27. On or about October 6, 1998, Central Purchasing appealed the November 25, 1997 Order to the United States Court of Appeals for the Federal Circuit.

28. After the appellate briefs had been filed, the parties filed a Stipulation for Dismissal of Appeal and Related Motion. Also, Mitutoyo and CEJ forgave the bill of costs. A copy of the Order from the United States Court of Appeals for the Federal Circuit dismissing the appeal is Exhibit 6.

29. Central Purchasing is precluded from re-litigating the validity and enforceability of U.S. Patent No. 4,743,902 as a matter of law.

COUNT II - BREACH OF CONTRACT

30. By agreement dated March 29, 1994 (Exhibit 7), Central Purchasing agreed that after disposal of its present inventory by June 30, 1994, that "neither it nor any of its divisions or controlled corporations will import into the United States or market in this country any electronic digital caliper that infringes the rights of Mitutoyo Corporation in U.S. Patent No. 4,743,902."

31. Central Purchasing has breached this agreement by selling infringing electronic digital calipers in at least 2002 and 2003.

RELIEF REQUESTED

Plaintiffs pray for the following relief against Central Purchasing:

A. Judgment that:

1. United States Patent No. 4,743,902 is not invalid and is enforceable against Central Purchasing;

2. Central Purchasing is barred by claim preclusion from challenging the validity and enforceability of U.S. Patent No. 4,743,902;

3. Central Purchasing has infringed U.S. Patent No. 4,743,902; and

4. Central Purchasing breached the March 29, 1994 contract.

B. An Order preliminarily and permanently enjoining Central Purchasing, its agents, servants, employees, attorneys, successors and assigns, and all others controlling, controlled by, affiliated with, in privy with, or in active concert with Central Purchasing, from infringing United States Patent No. 4,743,902.

C. An accounting of the damages sustained by plaintiffs by reason of Central Purchasing's infringement of U.S. Patent No. 4,743,902 and breach of the March 29, 1994 contract, including plaintiffs' lost profits, and that such damages be trebled pursuant to 35 U.S.C. §284.

D. An assessment of prejudgment and post-judgment interest on the damages awarded the plaintiffs.

E. An award of plaintiffs' costs, disbursements and attorney fees for this action, including those pursuant to 35 U.S.C. §285.

F. Such further relief as this Court may deem just and appropriate.

JURY DEMAND

Plaintiffs demand a jury trial on issues triable by a jury.

Dated: February 10, 2003

Respectfully submitted,

By: _____

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EXHIBIT

I

United States Patent [19]

Andermo

[11] **Patent Number: 4,743,902**

[45] **Date of Patent: May 10, 1988**

[54] **MEASURING DEVICE FOR CAPACITIVE DETERMINATION OF THE RELATIVE POSITION OF THE TWO WITH RESPECT TO ONE ANOTHER MOVABLE PARTS**

[75] Inventor: Nils I. Andermo, Taby, Sweden

[73] Assignee: Stiftelsen Institutet for Mikrovagsteknik vid Tekniska Hogskolan, Stockholm, Sweden

[21] Appl. No.: 942,016

[22] Filed: Dec. 12, 1986

Related U.S. Application Data

[63] Continuation of Ser. No. 558,427, Dec. 6, 1983, abandoned, which is a continuation of Ser. No. 272,072, Jun. 9, 1981, Pat. No. 4,420,754, which is a continuation of Ser. No. 964,961, Nov. 30, 1978, abandoned.

[30] **Foreign Application Priority Data**

Dec. 9, 1977 [SE] Sweden 7714010

[51] Int. Cl.[4] G08C 19/10

[52] U.S. Cl. ..... 340/870.37; 340/870.01; 340/562; 340/347 P; 324/60 C

[58] Field of Search ..... 340/870.37, 562, 870.01, 340/347 P; 324/61 R, 60 R, 60 C; 318/662

[56] **References Cited**

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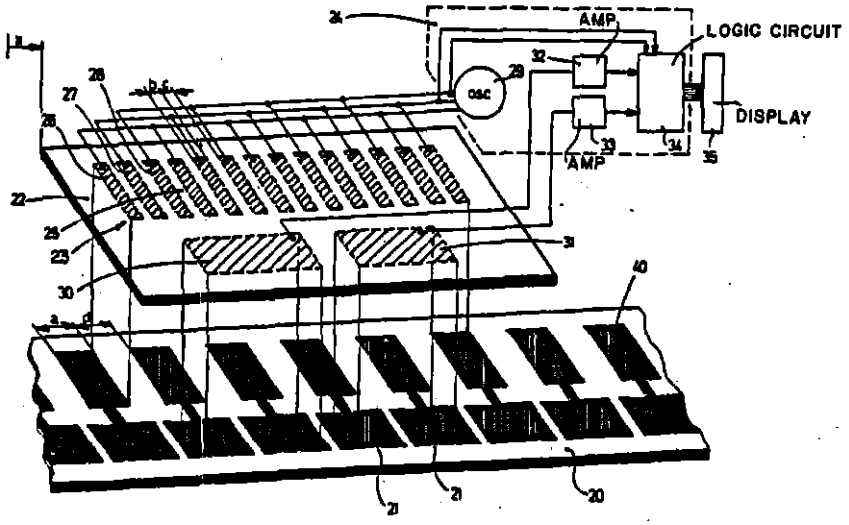
1523943	9/1978	United Kingdom .

Primary Examiner—John W. Caldwell, Sr.
Assistant Examiner—Mahmoud Fatahi-yar
Attorney, Agent, or Firm—Finnegan, Henderson, Farabow, Garrett & Dunner

[57] **ABSTRACT**

A system for measuring the relative movement of one object with respect to another, such as the movement of a slide with respect to a scale of a measuring instrument utilizes the capacitative effect of a series of electrodes associated with a slide and another series of electrodes associated with the cooperating scale, the changes in capacity caused by relative movement between the two members being analyzed by an electronic circuit.

3 Claims, 12 Drawing Sheets



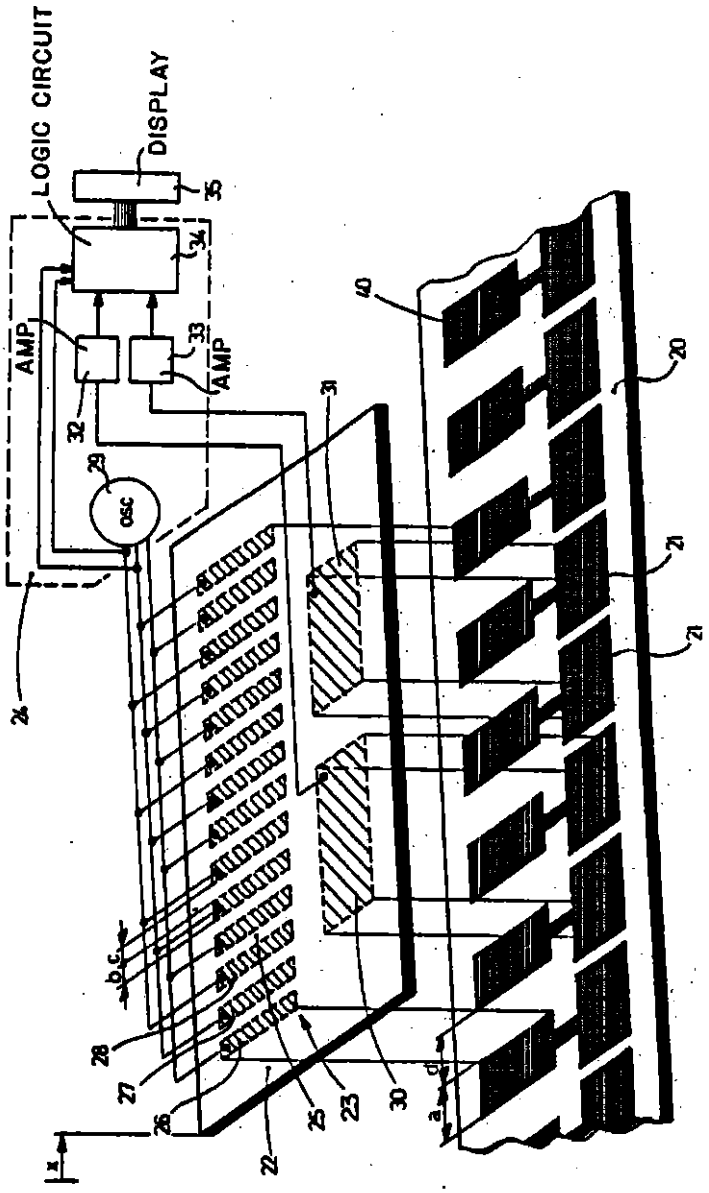

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Fig. 1

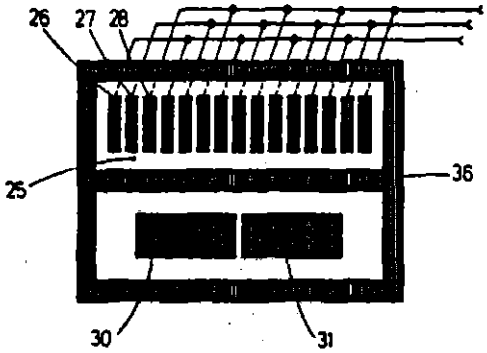
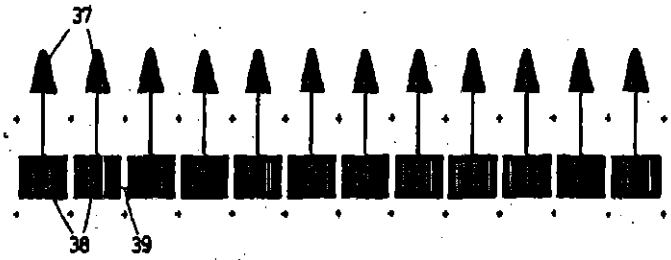


Fig. 2



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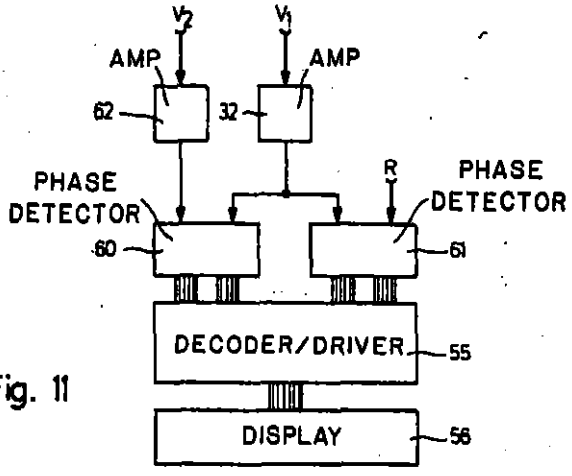

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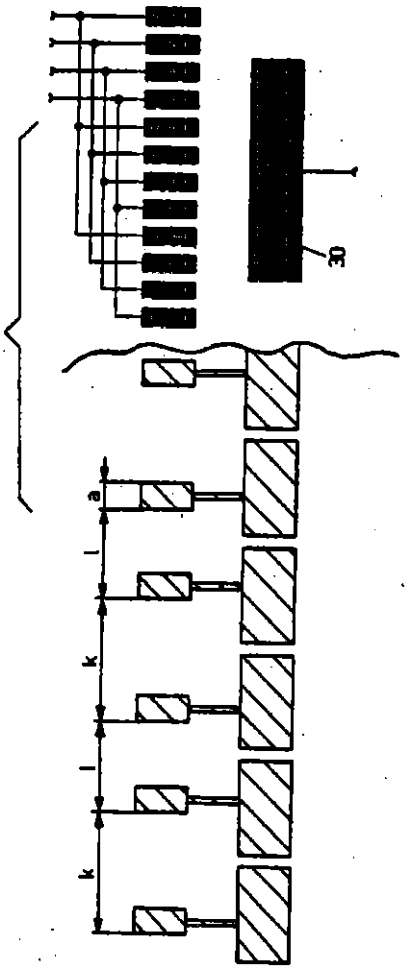

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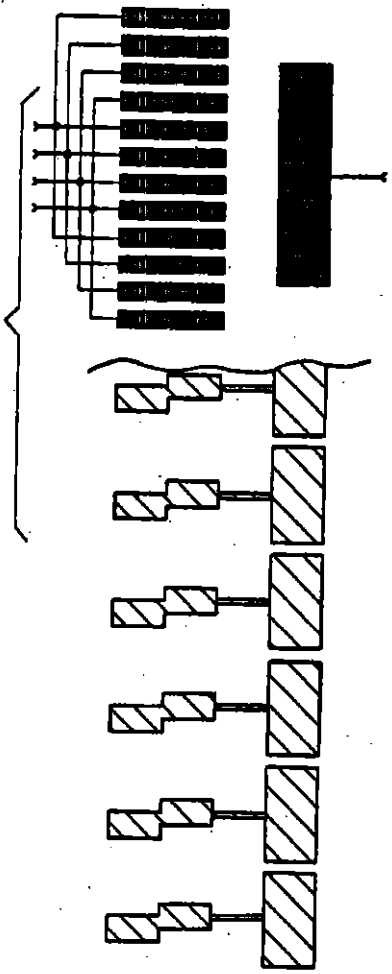

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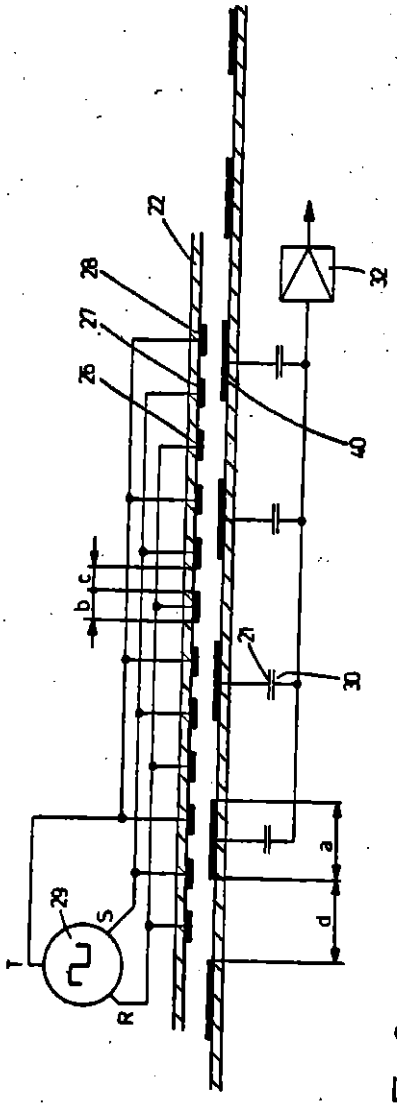


Fig. 6

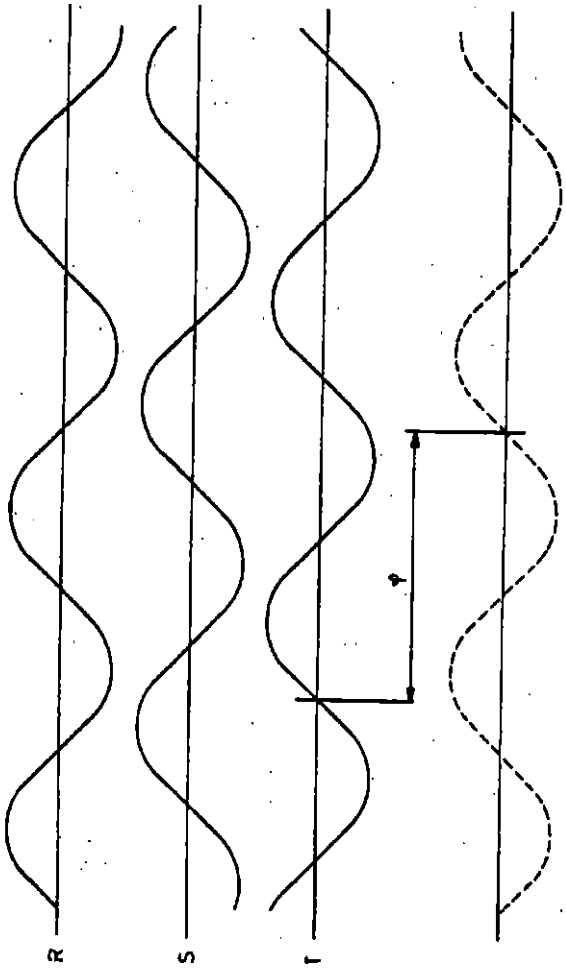
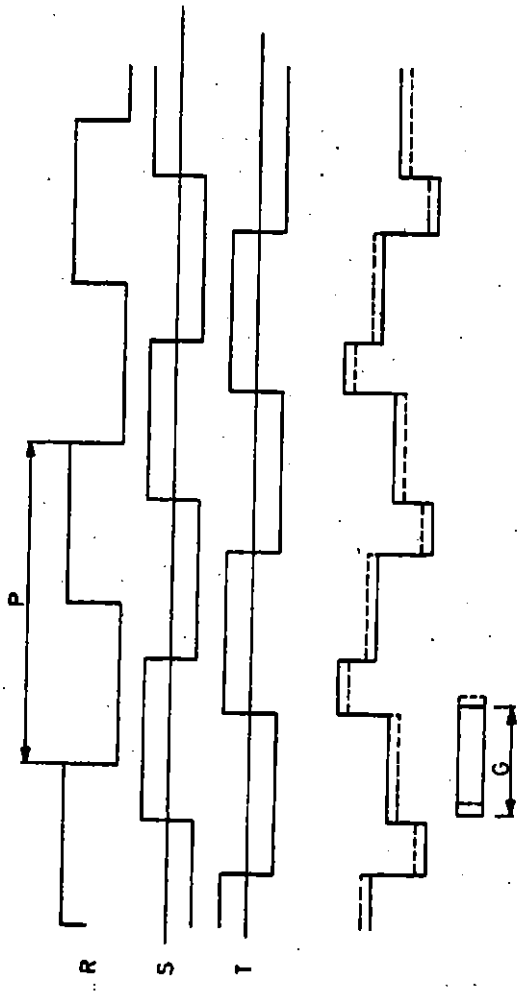


Fig. 7



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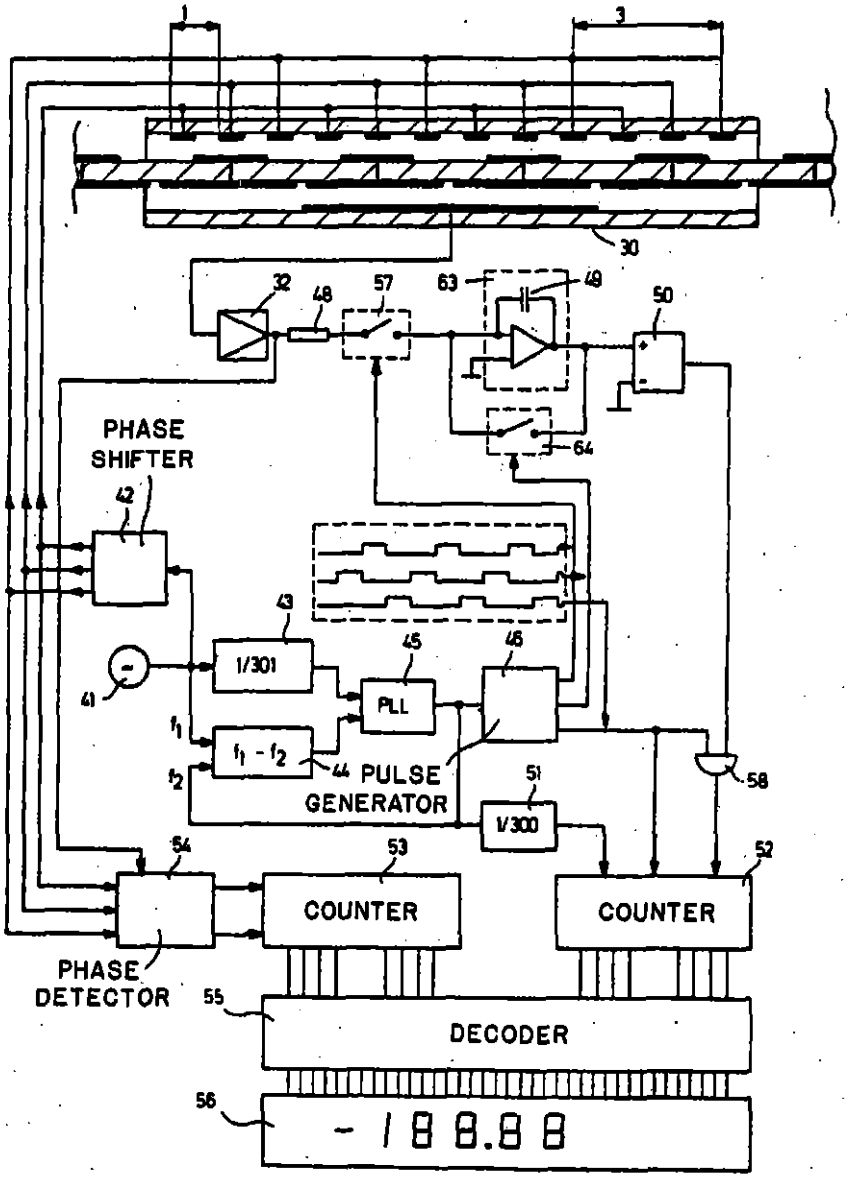
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Fig. 9

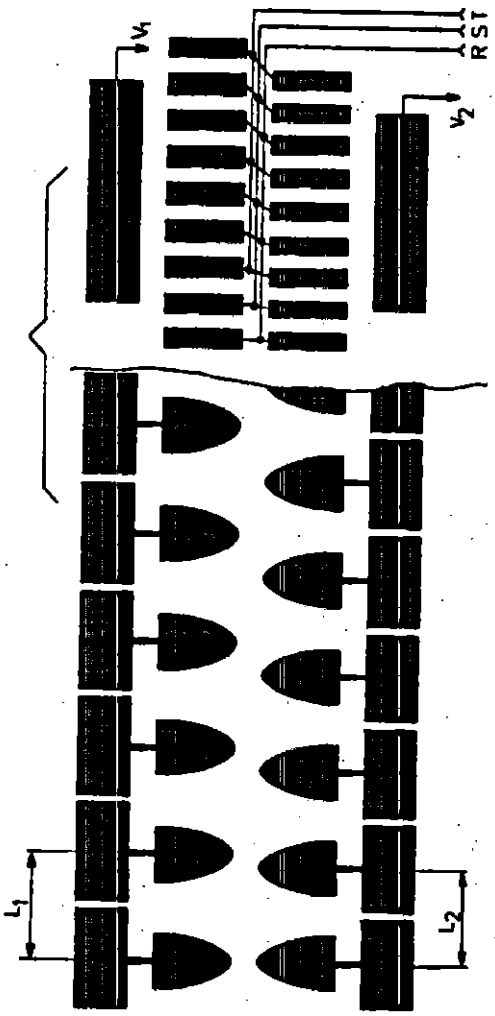
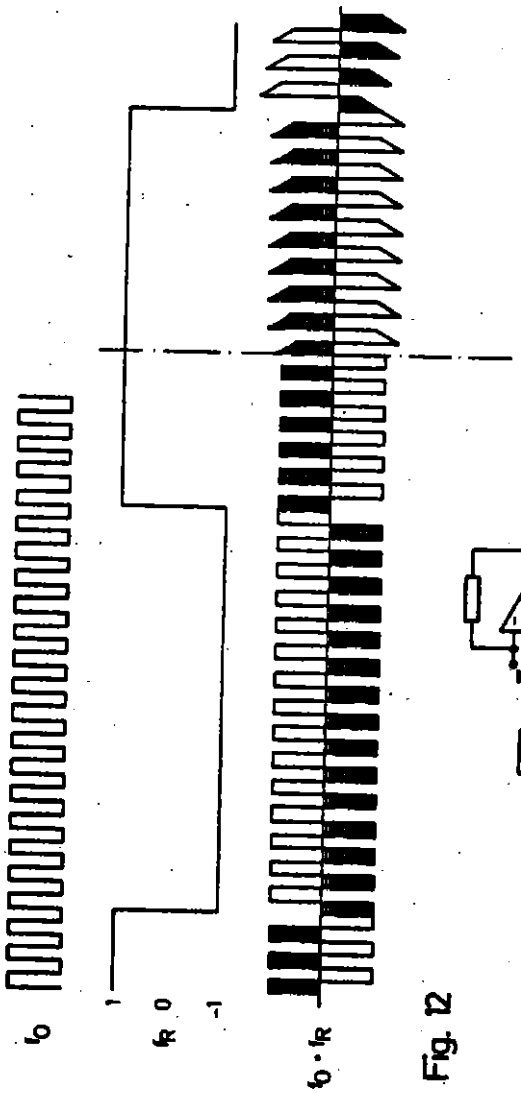


Fig. 10



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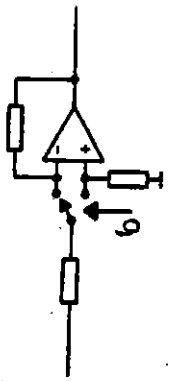

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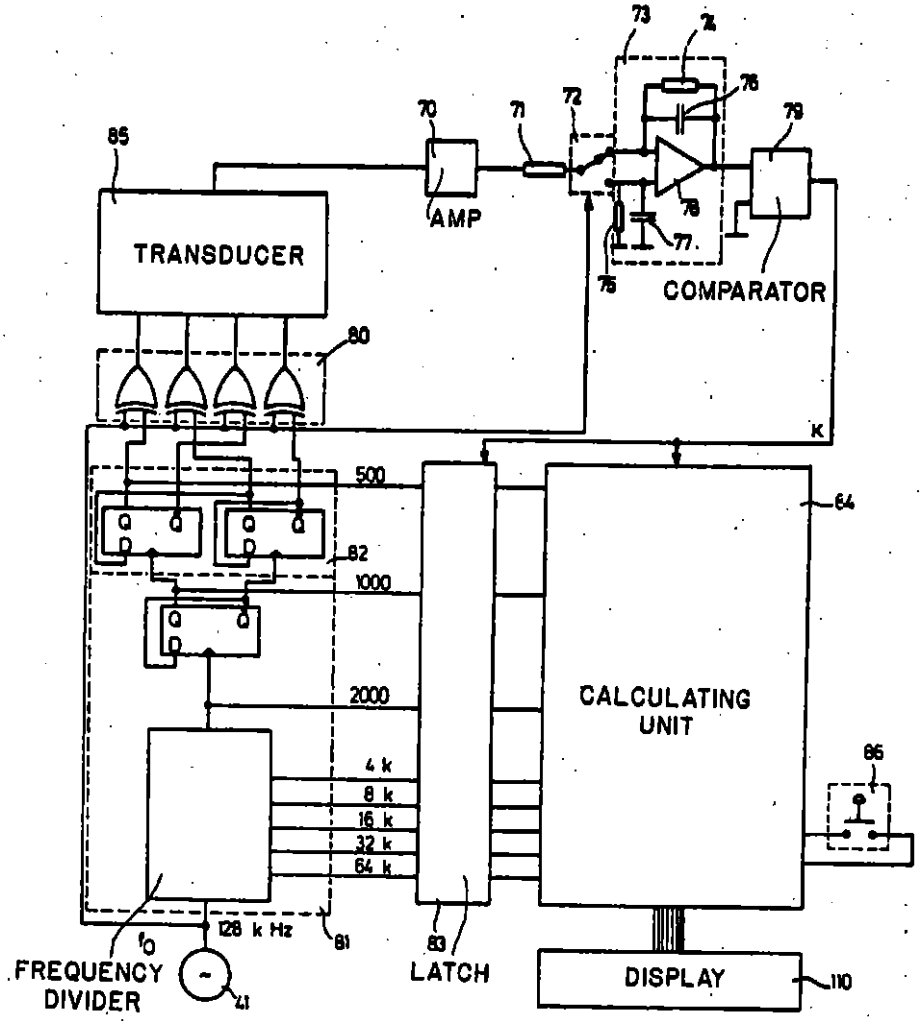
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Fig. 14

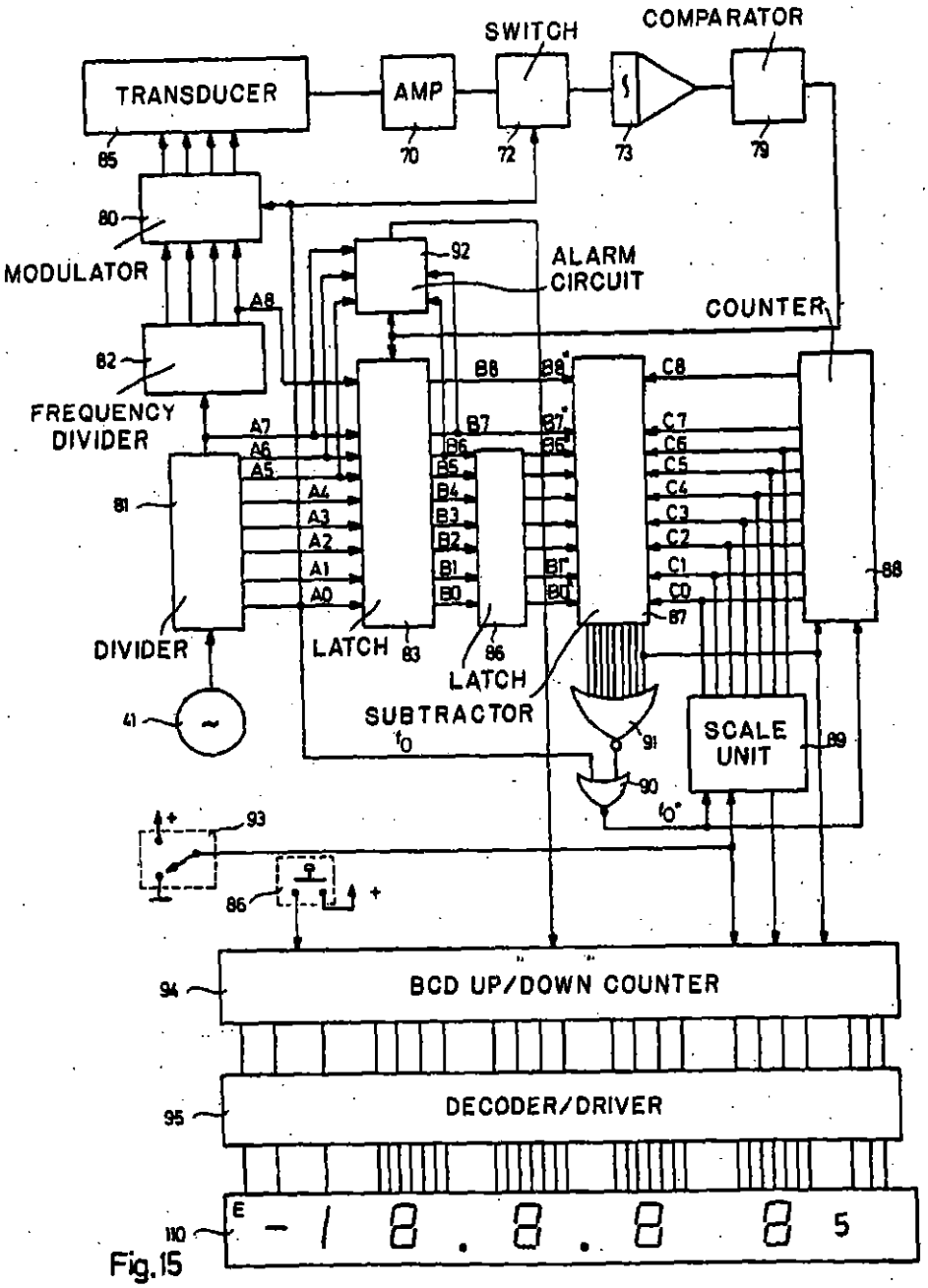
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Fig. 15

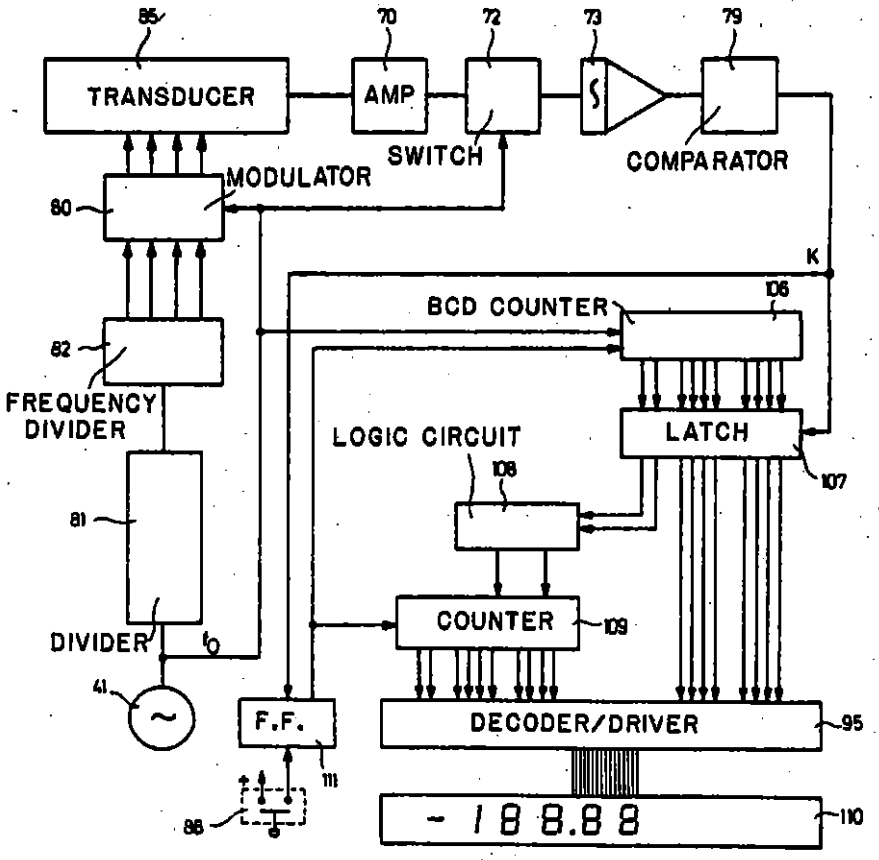

Fig. 16

MEASURING DEVICE FOR CAPACITIVE DETERMINATION OF THE RELATIVE POSITION OF THE TWO WITH RESPECT TO ONE ANOTHER MOVABLE PARTS

This is a continuation of application Ser. No. 06/558,427 (now abandoned), which is a continuation of Ser. No. 06/272,072 (now U.S. Pat. No. 4,420,754) which is a continuation of Ser. No. 05/964,961 (now abandoned) filed 12/06/83, 06/09/81 and 11/30/78 respectively.

The present invention refers to a measuring device for capacitive determination of the relative position of two with respect to one another moveable parts, for example the scale and the slide in a hand measuring tool.

More specifically, it is an object of the invention to provide a simple and cheap device with a good measuring resolution (0.01 mm) and low power consumption so that it can be used as a hand measuring tool, for instance a sliding caliper.

In the West German patent No. 2,246,660 there is described a capacitive angle measuring device which consists of a scale with a number of segments which is supplied by electrical pulses in a certain time sequence, whereby the signal from the detecting electrode on the moveable part of the measuring device is used for electrical determination of the position of this part.

This position determination is however only made in discrete steps corresponding to the graduation of the scale and the use of this principle for a resolution of more than 0.01 mm would imply unrealistically small segments on the scale.

In the West german patent No. 2,217,183 there is described a capacity length and angle measuring system which comprises a scale with two groups of electrodes, whereby the electrodes in each group are electrically connected to one another and the two groups are supplied with alternating voltages which are 180° phase displaced with respect to one another. The part moveable with respect to the scale, i.e. the slide in this measuring system is provided with a number of detecting electrodes which are connected to one another in groups whereby the phase position of these voltages are used for determination of the measuring value by means of interpolation.

The device according to the above cited patent will require certain cost and space consuming devices in order to make the interpolation linear. The patent furthermore requires an oscillator to be connected to the two electrode groups of the scale whereas the electrodes of the slides are to be connected to an evaluating electronics.

It is an object of the present invention to provide a device in which the above mentioned drawbacks are eliminated. In the capacitive length and angle measuring system according to the invention the electrodes of the scale are galvanically coupled nor to each other neither to the environment. All the electronics included in the system could therefore be located on the slide and it is not necessary to connect the scale with any wires or sliding contacts which would be limiting for the handling or the maintenance in for instance a hand measuring tool. As the electrodes of the scale are not coupled to one another it is also possible to effectively shield the electronic and the electrodes of the slide as well as the part of the scale close to the slide from the disturbance from the environment even if the scale in its remaining part is completely uncovered.

The invention will now be described in detail, reference being made to the enclosed drawing in which:

FIG. 1 shows a perspective view of a device according to the invention;

FIG. 2 is an example of the electrode pattern on the reading head;

FIG. 3 is an example of the pattern on the scale to be used in a sinus shaped supplying voltage;

FIG. 4 is an embodiment of the scale with an appertaining supplying pattern on the slide to be used for rectangular wave supply;

FIG. 5 is another embodiment of the scale with an appertaining supplying pattern on the slide to be used for rectangular wave supply;

FIG. 6 is a cross section along the supplying electrode of the scale and slide;

FIG. 7 is a time diagram for three phase sinus shaped supplying voltages and the voltage derived from the receiver of the system;

FIG. 8 is a time diagram of three phase rectangular shaped supplying voltages and an example of the signal obtained from the receiver of the system;

FIG. 9 is a block diagram of an embodiment of the electronics of the system;

FIG. 10 is an embodiment of a scale and slide pattern for absolute measuring within a wider range than one period of the scale pattern;

FIG. 11 schematically shows an electronics system for measuring by using a scale pattern according to FIG. 10;

FIG. 12 is a diagram of a supplying signal to be used in an apparatus according to the invention;

FIG. 13 is a synchronous detector to be used for detecting a signal according to FIG. 12;

FIG. 14 is a block diagram of an electronic system to be used in one embodiment of the invention;

FIG. 15 is a block diagram of another electronics system to be used in an apparatus according to the invention; and

FIG. 16 is a further embodiment of an electronic system to be used in an apparatus according to the invention.

The capacitive length and angle measuring system according to the invention comprises according to FIG. 1 a scale 20 which is provided with electrodes 21. These electrodes are evenly distributed along the scale and are electrically isolated from each other and from the environment.

Above the scale a slide 22 moveable along the scale is located, the slide comprising an electrode pattern and an electronic part 24 attached to the pattern 23. The electrode pattern of the slide, FIG. 2, comprises an area 25 with basically rectangular electrodes 26, 27, 28. These electrodes have the same width b and an internal distance c from each other and are furthermore oriented parallel to each other in a direction perpendicular to the length of the scale. The electrodes are connected to each other in three groups in such a way that every third electrode in the area 25 belongs to one of the groups. The three groups are supplied with the three output voltages from a three phase generator 29. These three output voltages are identical in shape and amplitude but are mutually displaced in time by one third of the period. The electrode pattern of the slide also comprises two rectangular electrodes 30, 31 which have an extension in the length direction of the scale corre-

sponding to several periods of the supplying pattern 25. These electrodes are connected to each one high imput impedance amplifier 32 and 33.

FIG. 2 shows a top view of the electrode pattern of the slide. In order to avoid a direct coupling between the supplying electrodes in the area 25 and the receiving electrodes 30 and 31 a shielding pattern 36 is provided. This pattern consists of a conductive layer which has a shape according to the figure and is connected to a signal wise neutral point in the signal treating electronics.

The ocillator 29 could be designed so as to generate sinus shaped voltages. The interpolation between the scale electrodes is thereby performed by measuring the phase angle of the voltage from the receiving electrodes (30 or 31) with respect to the oscillator 29. FIG. 7 shows the three supplying voltages R, S, T of the oscillator and by means of a dotted line the voltage obtained from the receiving electrodes 30 and 31. The phase angle will thereby by using a suitable design of the electrode pattern of the slide and the scale become a linear function of the displacement between the scale and the slide in the measuring direction.

FIG. 3 shows a design of the scale electrode pattern of the scale 20 which is raised to such a linear interpolation with rectangular supplying electrodes according to FIG. 2 and a sinus shaped supplying voltage.

The electrode pattern according to FIG. 3 consists of detecting electrodes 37 and transferring electrodes 38 connected to these electrodes. The detecting electrodes have a shape which means that their extension along the direction of measurement follows the positive part of a sinus function having a length of period equal to that of the supplying pattern of the slide. Each such semi-sinus shaped detecting electrode 37 is connected to a transferring electrode 38. The detecting electrodes 37 of the scale are located within the area which are covered by the electrodes 26, 27, 28 of the slide when the slide is displaced along the scale. Between each transferring electrode there is a small isolated space 39 the extension and shape of which does not primarily affect the phase angle since all shielding and transferring electrodes located under the slide have essentially the same potention. It is, however, important for the signal amplitude from the receiving electrodes that these electrodes and the transferring electrodes have a big hugely covering surface.

In the above described design of the detecting electrodes a linear interpolation function will be obtain independently of the relation between the electrode width b and the electrode interval c of the supplying pattern (FIG. 1). This pattern can thereby be optimized with respect to desires of good transferring capacitance and limitations concerning isolation distances in the production technique used.

It is possible to increase the signal amplitude used by a factor 2 and simultaneously decrease the influence of possible external electrical disturbances in the system by using another detecting pattern identical to the pattern according to FIG. 3 but phase displaced by a half period in the measuring direction and having this pattern reversed relative to a line through the detecting electrodes. The pattern of the slide is thereby provided with further receiving electrodes on the opposite side of the supplying pattern with respect to the electrodes 30, 31. The useful signal from the receiving electrodes on the respective sides of the supplying pattern are now in opposite phase and are combined and could be amplified in a differential amplifier whereby external electrical disturbances having the same phase position on all receiving electrodes will be eliminated.

The electronics unit 24 comprises in addition to the oscillator 29 and the signal amplifiers 32, 33 a logical unit 34 which converts the phase shift to a measuring value which is presented on a display 35. The unit 34 is provided with at least two reference phase signals from the oscillator whereby it is possible by means of incremental counting to count the number of periods passed in the scale pattern as well as to perform the interpolation within the period by means of the phase measuring.

The splitting of the receiving electrodes in two parts 30 and 31 with appertaining amplifiers 32 and 33 has been made in order to make the system self-controlling with respect to errors that might araise because of dirt or mechanical damages on the scale and the supplying pattern. The logical unit 34 is designed and programmed in such a way that it alternatively measures the two measuring channels. If the result from these measurements is not identical an error indication is obtained and the electrode patterns will be controlled and cleaned by the operator. When manufacturing a complete low cost system using electronics it is advantageous to use a digital technique to the highest possible extent. In the above described system the sinus voltage is suitably obtained in a digital sinus generator by means of splitting the sinus period in a large number of pulses of a constant amplitude but with a varying width so that the signal after passing a filter is giving the desired pure sinus shape. This filter can be located between the oscillator and the supplying pattern whereby it should be designed so as to treat all supplying phases equally with a high accuracy. Filters can also be connected between the amplifiers 32, 33 and the logical unit 34.

A further simplification and reduction of cost of the electronics in the capacitive length and angle measuring system is obtained by using a design which permits supplying the supplying electrodes with rectangular waves of the basic frequency of the device. FIG. 8 shows these supplying voltages (R,S,T) for a three-phase system and the signals ("signal") thereby obtained from the receiving electrodes 30, 31. In this system it is not possible as in the system using sinus voltages to use the zero passages of the receiving signals to detect the position. The zero passages will namely be stepwise displaced between a number of fixed positions when the slide is moved along the scale. If, however, the electronics forms the average value of the signal within a time gate ("gate" in FIG. 8) a voltage will obtained which is a function F(x,y) of the position of the gate (y) with respect to the supplying voltages and of the position (x) of the slide with respect to the scale. With a suitable dimensioning of the length of the gate and of the width and the shape of the electrodes of the scale system it is possible to make the function F(x,y) to become zero at a predetermined relation between x and y.

$$F(x, y)=0 \text{ for } x-N\,L=ky$$

where

N=an integer

L=the period length of the supplying voltages

k=a constant

FIG. 6 shows a cross section through the slide and the scale for such a dimensioning of the electrode pattern. Here the width b is equal to the interval c for adjacent rectangular supplying electrodes. The rectan-

gular electrodes of the scale have a width a which is equal to two times the width of the supplying electrodes plus the interval c. The scale electrodes are distributed along the scale with the same periodical split L as the period length of the n-phase supplying pattern. The gate time G should be equal to the time difference between adjacent phases in the n-phase system. The prerequisite for obtaining a linear relation between x and y in this case could thus be summarized as follows:

$c=b$

$a=3\,b$

$d=L-a$

$G=1/n\cdot P$

P=Period time of the supplying voltage

By using this dimensioning of the electrode pattern and the gate time it is possible to design a simple electronics unit which automatically presents a measuring value corresponding to the position of the slide with respect to the scale in terms of electrical signals to be transferred to a figure display or for use in controlling a mechanical position.

In FIG. 9 there is shown an example of such an electronics unit. In this unit the three rectangular voltages R, S, T are generated by splitting a frequency f_1 of for example 30 kHz from an oscillator 41 in the unit 42 by three under three different phase-displacements each corresponding to one third of the period of time of the output voltages.

The unit 45 is a phase locked circuit which could be designed for instance as the CMOS-circuit CA 4046. This circuit contains a voltage controlled oscillator, the frequency of which is controlled by a phase sensing circuit, so that the two input frequencies f_{11} and f_{12} are made to be exactly identical. The frequency f_{11} is obtained by dividing the frequency f_1 and the output frequency f_2 from the unit 45. This means that the frequency f_1 is controlled in such a way that

$f_1-f_2=f_1/301$

which is equivalent to

$300f_1=301f_2$

In the unit 46 there is generated a pulse, the length of which is equal to one period of the frequency f_2 and the frequency of which is equal to $f_2/3$. The phase position with respect to the supplying frequency f_0 of the scale will be displaced 1/300 of the period of time f_0 for each period of the gate pulse (corresponding to 1/100 mm if L=3 mm). Within a time space of three hundred gate pulses the phase position of the gate pulse relative to the signal voltage of the scale will sweep along all possible values in steps corresponding to 1/100 mm. The gate pulse controls the switch 57 so that the switch is closed during the gate period. The integrator 63 forms the average value of the signal during this time. Immediately before starting of the gate time the integrator has been set to zero by the switch 64 which is controlled by a pulse from the unit 46. The output voltage of the integrator is coupled to a comparator 50 which detects whether the integrator voltage is positive or negative. During the period of time following immediately after the gate time the output of the comparator is connected to the counter 52 via the gate 58. When the average value of the signal during the gate time passes zero from a negative value to a positive value the counter 52 will be stopped. This occurs at a point of time within the sweep which is a function of the mechanical position of the slide with respect to the scale.

In the unit 51 the frequency f_2 is divided by 900 whereby a rectangular wave of the same frequency as the sweep is obtained, but having a phase position which is independent of the mechanical position of the measuring device. This rectangular wave from the unit 51 will thus be a reference when determining the displacement of the phase position for the zero passage of the comparator 50 when the slide is mechanically displaced with respect to the scale. A zero setting of the phase position of this reference voltage so that it coincides with the phase position of the output voltage of the comparator when the slide is in its mechanical position can easily be provided by means of zero setting (Reset) of the counter in the unit 51 when the output voltage of the comparator changes its logical level from zero to one.

The unit 52 is a counter which is reset and started by a change of the output voltage from the unit 51, and upon being started counts pulses from f_2 until a corresponding change is reached from the comparator 50 via the gate 58. The number of pulses thereby counted corresponds to the number of 0.01 mm displacement of the slide with respect to the scale from the zero position within the period (3 mm) of the supplying pattern.

For determining the number of periods which the slide has been moved along the scale the measuring signal is detected after having passed the amplifier 32 and is transferred to the unit 54. This unit can be using technique known per se by means of reference phases (R,S,T) from the phase splitter 42 of the oscillator detect the phase displacement of the measuring signal due to the movement of the slide along the scale in increments of $\frac{1}{3}$ of the supplying signal period corresponding to 1 mm movements of the scale. The unit 54 can also determine the direction of movement and generate pulses for incrementing or decrementing of the counter 53 in correspondence with the displacement of the scale. The counter 53 is set to zero when the scale system is set to zero whereafter it gives a number on its output corresponding to the deviation in logic from the zero position in millimeters.

The output signal from the counter 52 and 53 is adopted in the unit 55 so as to drive a figure display 56. Alternatively the output signals from the counter 52 and 53 could be used for external treatment and possible control of a part of a machine, the position of which is detected by the scale system.

FIGS. 4 and 5 show two other embodiments of the electrode pattern for the scale and the slide to be used in the system with four or more phases. In the scale pattern according to FIG. 2 every second detecting electrode has a displacement in the direction of measuring which is equal to L/2n from the regular split L. L is equal to the length of the supplying pattern and n is number of phases. The receiving electrode 30 should have a length equal to an even number of period lengths L. The width of each detecting electrode is equal to L/n.

In the electrode pattern according to FIG. 5 the detecting electrodes are evenly distributed with the period L but each electrode consists of two equally sized parts each having the width L/n having an inherent displacement in the measuring direction of L/2n.

The two scale patterns according to FIGS. 4 and 5 shall have a width b of the supplying electrodes and an interval c=L/2n and the gate length G of the electronics according to FIG. 9 G=2P/n.

The capacitive length and angle measuring system according to the invention can also be designed so as to

make possible an unambiguous determination of the mechanical positions without any continuous control of the movement of the slide through counting of the number of periods passed.

FIGS. 10 and 11 illustrate such an embodiment of the system. The scale according to FIG. 10 has been provided with two rows of electrodes with the division L and L_2, respectively. The slide is provided with corresponding n-phase supplying patterns with the period length L and L_2, respectively. The electrode patterns of the scale and the slide comprise for each row of electrodes as in the previously described embodiments transferring electrodes so that from the slide two signals V_1 and v_2, respectively are obtained for treatment in the electronics part. The position within each period of the pattern is determined as above through phase measurement of the voltage V_1 with respect to one of the supplying phases, for instance R. By measuring the phase angle between the two signals V_1 and V_2 it is furthermore possible to make an unambiguous determination of the position within a long path M which has an extension M as follows:

$$M = L_1 \cdot \left(\frac{L_1}{L_1 - L^2_2} \right)^{-1}$$

Ex. $L_1 = 3$ mm, $L_2 = 3\ 100/101$ mm. Thus $M = 300$ mm.

FIG. 11 shows a block diagram of an electronics to be used for such an unambiguous absolute measuring of the position of the slide above the scale. References 32 and 62 denote amplifiers with a high input impedance for the signals from the two receiving electrodes of the slide. The signals V_1 and V_2 thus amplified are supplied to the unit 60 and 61 whereby the unit 60 determines the coarse position of the slide through measuring of the phase angle between V_1 and V_2. In the unit 61 the exact position of the slide is determined in the similar manner through measuring of the phase angle between the signal V_1 and one of the phases (R) of the supplying oscillator of the slide. The units 55 and 56 are cosigned as in the corresponding units in FIG. 9, Decoder/Driver and Display unit, respectively.

The system described in connection with FIG. 10 is designed to be used with a three phase sinus voltage. It is, however, possible also to modify the above described system to be used with a rectangular wave voltage in a corresponding way so that an unambiguous measurement of the position of the slide with respect to the scale can be made.

In the system where the scale is supplied with a rectangular wve it is important for the linearity of the interpolation that the shape of the signal is not changed before the integration along the time gate "G". A problem is that the signal is coupled from the scale with a very low transferring capacity. In practice the supplying impedance for the signal from the amplifiers 32, 33, 62 is not more than one pico farad. It is therefore necessary with some sort of direct voltage connection to ground from the amplifier inputs. In the compact design of the electronics which is desirable when used as a hand tool it is in practice difficult to use resistances of a higher value than a few ten megaohm. One will thereby obtain at the amplifier input a high pass filter effect with a time constant of for instance 200 us. With a measuring frequency f^0 of 10 kHz one will thereby obtain a deviation from a linear interpolation function which is not neglectable in comparison to the desired resolution of 1/100 mm.

It is possible to reduce considerably the above described problem in a system where the scale is supplied with a high frequency signal which for the n inputs is modulated with the n phases of a relatively low frequency. After the modulation in a synchronous detector controlled by the HF-signal one will in the receiver obtain a signal consisting of a combination of the low frequency input phases of the same principle appearance as "signal" in FIG. 8. The high frequency modulation involves an increased tolerance with respect to resistive shunting of the transfer capacitance in the capacitive scale system because of the reduced capacitive transferring impedance. One will furthermore achieve that a resistant shunting of the transferring impedance due to for instance contaminants on the scale, will not affect the relative shape of the LF-envelope but will only involve a linear decrease of the amplitudes. Thus, the measuring value received will be unaffected until the resistive load is so heavy that the detected LF-signal has had a considerable decrease of its amplitude.

In FIG. 12 there is shown an example of the above described signal. The low frequencies rectangular wave signal is multiplied with a high frequency signal whereby a HF-signal with a constant amplitude and a phase which alternates with the LF-modulation is obtained.

The synchronous detector could be designed as shown in FIG. 13. The input signal will thereby be shifted between the positive and negative input of the amplifier by means of a switch controlled by the HF-signal f_0. Thereby the shaded parts of the modulated signal in FIG. 12 will be connected to the positive input of the amplifier whereas the remaining parts of the signal will be connected to the negative input.

In the left part of FIG. 12 there is shown how the signal is changed after passing a high pass filter, corresponding to the resistive load due to contaminants on the scale. One realizes that the signal after passing a demodulator according to FIG. 13 will be mainly in accordance with the low frequency signal f_R even at a rather high resistive load on the scale.

In FIG. 14 an electronic system is shown, where the above described principle with a HF signal multiplied with a LF square wave is applied. A frequency F° of for instance 128 kHz from the oscillator 41 is in a 7 step binary frequency divider divided down to 1 kHz. In unit 82 a further division with two is made and four 500 Hz square waves with equal spaced phase positions is made. The four 500 Hz signals are in the modulator 80 combined with f_0 and the transducer 88 will be fed by four 128 kHz signals, which change phase by 180° according to the polarity of the resp 500 Hz signals.

The part of the signals which are coupled through the transducer to its output is amplified in the amplifier 70. Then it is demodulated and integrated in the units consisting of the resistor 71, the switch 72 and the integrator 73. The switch 72 is controlled by the f° frequency demodulated and the LF signal remains for integration. The resistors 74 and 75 in the integrator have a high value, the resulting time constant with the capacitors 76 resp 77 being much higher than the period time of the LF signal. The output signal U_0 from the integrator is a sum of two triangular waves with ½ period phase difference and amplitudes which are a function of the transducer positions. The zero crossings of the com-

posed wave will be detected by the comparator 79. The comparator output K will be a square wave with a phase position relative to the transducer LF input modulation, which is a function of the transducer position. The positive-going edge of the square wave will trigger the latch unit 83 which latches the binary value of the frequency divider chain 81–82 at the instant. Thus the latch unit 83 will on its output give a binary value representing the position of the transducer within the period of the scale pattern.

The output from the latch will in the calculating unit 84 be processed and the following functions can be performed:

(a) Correction for remaining unlinearities in the scale interpolation function: Phase position of K=f (transducer position)

(b) Calculation of coarse position i.e. the number of periods in the scale pattern which the transducer is moving. This information is obtainable from successive latch outputs if the transducer movement between successive K periods is smaller than half a period in the transducer pattern

(c) Zero setting: Upon operation of the switch 86 the calculating unit registers the actual position value and thereafter calculates the transducer movement from that value.

(d) Adaption of the scale factor for the transducer for mm or inch reading.

(e) Transformation of the measurement value of a form suitable for driving the display unit 110.

These functions can be performed in a u-computer programmed for the wanted operations. In application of the invention in a digital caliper it is however very important to get a compact and cheap solution.

In FIG. 15 a solution for the electronic system is shown, which is advantageous in component count and well suited for integration in a few monolitic circuits. The system in FIG. 15 is similar to the system in FIG. 14 regarding the blocks 41, 70–83. The output (B) from the latch 83 is in the unit 86 adjusted for unlincarities in the scale function whereafter a new binary value (B') is contained which is fed to one side of the subtractor 87. To the other side of the subtractor the output (C) of a binary up/down counter is connected. The unit 86 can be a read-only-memory (ROM) of known kind. When the (C) value is not equal to the (B') value the gate 90 is open and F_0-pulses are fed to the counter 88. The most significant bit (MSB) of the output from the unit 87 is used as a signal (Up/Down) for controlling the counting direction of the counter 88 corresponding to the direction of movement of the transducer.

When the counter value (C) reaches equality with the value (B') the gate 91 gives a high output to the NOR gate 90 and the gate closes for the f_0 pulses and the counter 88 stops.

The clock pulses f_0 to the counter 88 are also fed to the unit 89, which removes a suitable number of the pulses in the pulse train f_0, giving a new pulse train f_m adapted for mm or inch scale factor.

The unit 94 contains a BCD up/down counter. It is clocked by the pulse train f_m. The counting direction for this counter and the counter 88 is controlled by the same signal. Thus the counter in unit 94 will follow the movement of the transducer 85 with the proper scale factor for inch or mm according to the setting of switch 93.

The unit 95 is a decoder/driver for adapting the BCD output from unit 94 to the coding and driving requirements of the display unit 85.

The unit 92 is included in the system for checking the speed of movement of the transducer. If this speed is to great the unit 92 will give an error alarm, which will be latched in unit 94 and an error message will be displayed on the display unit 110.

Zero set of the measuring system will be made by pressing the switch 86 whereby the counter and the error latch in unit 94 will be reset to zero. In FIG. 16 an electronic system for a digital caliper is shown. It is based on the principles for a linear scale function as described above and contains the continuous integration of the LF signal.

The oscillator 41 is delivering for instance 200 kHz to the frequency divider 81. This divides the frequency by 200 and the unit 82 will give a four-phase square wave output of 500 Hz. In the modulator 80 the four LF phases will be multiplied by the 200 kHz frequency and the transducer will be fed by the four resulting HF signals. The output of the transducer will be amplified in unit 70, multiplied with the 200 kHz in the demodulator 72 whereafter the resulting signal is integrated in the integrator 73. The zero crossings of the integrator output signal are detected by the comparator 79, whose output K will be a square wave with a phase position relative to the four phase LF signals from unit 82, which is a function of the transducer position.

The unit 106 is a BCD counter which is clocked by the 200 kHz signal. It has a counting cycle of 400 pulses and thus runs synchronously with the divider chain 81–82. When the switch 86 is closed the counter 106 is set to zero by a reset signal from unit 111. This reset signal is triggered by the leading edge of the K pulse. Unit 107 latches the output of the counter 106 for each leading edge of the pulse K.

The output of the latch 107 thus will represent the position of the transducer 85 within the scale period relative to the zero setting. In unit 108, a logic network is sensing the change of output value on the two most significant bits of the latch 107, representing foru one-mm steps in transducer movement. Provided that this movement never is more than one mm pro K-pulse, the unit 108 will then correctly give clock pulses and direction signal to the coarse counter 109, which will indicate mm count for the transducer movement.

The outputs from the coarse counter 109 and the fine latch 107 is in the decoder/driver unit 95 transformed to signals for driving a digital display 110.

The examples of the design of the invention given above have been related to a measuring tool or measuring linear mechanical displacements. It is however also possible to design the scale system for measuring of angular positions whereby the scale for instance is made as a band on the outer territory of a cylinder and the slide being located on the inside of another concentric cylinder. Another way of redesigning the linerally extending scale system to a circular scale system is to perform a transformation of the system for the scale and the slide so that the linearly extending coordinate X is equivalent to an angular coordinate. The scale and the slide would then be designed as two discs on a common axis being located close to each other.

By using the electronics according to for instance FIGS. 9 and 11 it is thereby possible to obtain a simple and cheap measuring system without any mechanical load on the measuring object, the system having the

possibility of generate accurate information of the angular position in digital form.

We claim:

1. A measuring device for capacitative determination of the relative position of two relatively movable parts with respect to one another comprising a slide provided with a number of groups of supply electrodes distributed along the direction of relative movement, each of the groups having n number of supply electrodes, n being an integer greater than 2; signal generator means having n number of signal outputs, each of the supply electrodes in each group being connected to a respective one of said signal outputs whereby all supply electrodes are supply with voltages according to a cyclic pattern, the slide also being provided with at least one receiving electrode; a signal processing unit connected to at least one receiving electrode; a scale being provided with a single electronic pattern comprising internally galvanically isolated scale electrodes, each scale electrode comprising two mutually galvanically connected parts, one being a detecting part and being located close to the area of the scale over which the supply electrodes of the slide can be moved, the other of the two parts being a transferring part and being located close to the area over which the at least receiving electrode of the slide can be moved, whereby the position of the slide along the scale determines the signal from the at least one receiving electrode which is derived from at least two adjacent supply electrode signals and the position of the slide with respect to the scale can be determined by the identification in the signal processing unit of the phase position of said signal from the receiving electrode.

2. The measuring device according to claim 1, wherein said signal generator means having n number of signal outputs generates n periodical signals of the same amplitude and frequency whereby the signals are phase displaced with respect to each other by N·(360/n) degrees, where N is an integer.

3. The measuring device according to claim 2, wherein the n phase generator means includes means to supply electrodes with a rectangular voltage and the signal from said at least one receiving electrode is subject to an average value determination during a particular time period whereby the received voltage is a function of the phase position of the time period with respect to the rectangular voltage and of the position of the slide with respect to the scale.

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EXHIBIT

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UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

CENTRAL PURCHASING, INC., a California Corporation, Plaintiff, v. MITUTOYO CORPORATION, a Japanese Corporation, and C. E. JOHANSSON AB, a Swedish Corporation, Defendants.	Civil Action No. 95-2014 JGD(GHKx) FIRST AMENDED COMPLAINT FOR DECLARATORY JUDGMENT OF PATENT INVALIDITY OR UNENFORCEABILITY

JURISDICTION AND VENUE

1. This Court has exclusive subject matter jurisdiction over the present action pursuant to 28 U.S.C. Sections 1332(a), 1338, 2201 and 2202.

2. Venue is proper in this district. Plaintiff resides here. Defendants carried out acts and transactions giving rise to the causes of action here.

/ / /

IDENTITY OF THE PARTIES

3. Plaintiff, Central Purchasing, Inc. ("Central") is a California corporation headquartered at 3491 Mission Oaks Boulevard, Camarillo, California 93011. Central is a retailer and distributor of hardware, tools and related items.

4. Defendant, Mitutoyo Corporation (Mitutoyo) is a Japanese Corporation headquartered at Landic Mita-Building, North # 31-19, 5-Chome North Shiba, Minato-KU, Tokyo, Japan. Mitutoyo, among other things, sells precision measuring tools including an electronic measuring caliper that is the subject of this lawsuit (Caliper).

5. Mitutoyo maintains offices in the United States for the conduct of its business activities including sales of the Caliper, including an office at City of Industry in this judicial district.

6. Defendant, C. E. Johansson AB (Johansson), is a Swedish Corporation, with headquarters at Fraktgatan 6, Eskilstuna Sweden 63181. Johansson has an interest in the patent which is at issue in this lawsuit.

BACKGROUND OF THE CONTROVERSY

7. Defendant Johansson is the owner of United States Patent No. 4,743,902 (hereinafter "'902 patent"), entitled "Measuring Device for Capacitive Determination of the Relative Position of the Two with Respect to one Another Movable Parts," issued to Nils I. Andermo on May 10, 1988 and is based on an application filed on December 12, 1986.

8. Defendant Mitutoyo is a Licensee under the '902 patent and acts as an agent of Johansson in matters concerning the patent in the United States. The scope of said agency encompasses all the acts of Defendant Mitutoyo Corporation alleged herein.

9. Plaintiff has been engaged in the manufacture and sale of electronic digital calipers in competition with Mitutoyo.

10. Defendant Mitutoyo Corporation represented in letters to plaintiff in this District that it was entitled to enforce the '902 patent and alleged that plaintiff's competing electronic digital calipers infringed the '902 patent. Mitutoyo threatened suit and Central ceased sales of its competing calipers to its substantial financial detriment.

11. Central wants to resume sales of its competing calipers free of the deterrence of Mitutoyo's threats. An actual controversy within this Court's jurisdiction exists between plaintiff and defendants with respect to the validity, enforceability or infringement of the '902 patent.

12. This action is brought for declaratory relief under the patent laws of the United States, 35 U.S.C. § 1 et seq.

COUNT I

Patent Invalidity Because of Unpatentability

13. Defendants' '902 patent is limited in scope, and

is invalid and void, for the following reasons among others:

(a) The alleged invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the alleged invention thereof by the applicant for the '902 patent;

(b) The alleged invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for the '902 patent in the United States;

(c) The alleged invention was described in a patent granted on an application for patent by another filed in the United States before the alleged invention by the applicant for the '902 patent;

(d) The applicant for the '902 patent did not himself invent the subject matter sought to be patented;

(e) Before the applicant's alleged invention thereof, the invention was made in this country by another who had not abandoned, suppressed, or concealed it;

(f) The claims of the '902 patent are anticipated by prior art;

(g) Any differences between the subject matter of the claims of the '902 patent and the prior art are such that the subject matter as a whole would have been obvious at the time the alleged invention was made to a

person having ordinary skill in the art to which the subject matter pertains; and

(h) The patent was issued without due investigation, rejections made by the assigned Examiner were not properly pursued, relevant prior art was overlooked, and other relevant prior art was improperly construed and applied, and therefore the Commissioner of Patents exceeded his authority in granting the '902 patent.

14. The Patent and Trademark Office Examiner failed to cite pertinent prior art as references and thus the presumption of validity of the '902 patent in this suit provided in Title 35 § 282 of the United States Code is destroyed.

COUNT II

Patent Invalidity Because of Uncontested Obviousness

15. The '902 patent is a continuation of U.S. Patent No. 4,420,754 (hereinafter " '754 patent ").

16. The applicant did not contest the patent examiner's ruling that the claims of the '902 patent were obvious in view of the '754 patent and other patents.

17. Because of its obviousness the '902 patent is invalid.

18. Required measures to cure the invalidity of the 902 patent were never carried out by the applicant.

/ / /

COUNT III

Patent Unenforceability Because Of Inequitable Conduct

19. In the prosecution of the application for the '902 patent, the assigned Patent and Trademark Examiner rejected all the claims as being obvious over the '754 patent in combination with two other references based on the judicial doctrine of obviousness-type double patenting.

20. In response to the rejection, the applicant of the '902 patent elected to file a terminal disclaimer to overcome the rejection which would have the effect of dedicating a portion of the life of the '902 patent to the public so that the '902 patent did not exceed the life of the '754 patent.

21. The applicant filed a terminal disclaimer which was subsequently rejected as being defective. The applicant ignored the Examiner's rejection of the terminal disclaimer and never filed a proper terminal disclaimer to overcome the Examiner's rejection.

22. The Examiner was unaware that the applicant did not correct the rejected terminal disclaimer as required, and the patent issued without any indication that it should expire on December 13, 2000 as mandated by the Patent and Trademark Office. Instead, the '902 patent falsely indicates that the '902 patent would have a full 17 year term and would expire on May 10, 2005.

23. No attempt was ever made by the applicant, assignee, patent attorney/agent, and/or others in interest, to file a corrected terminal disclaimer even though they

knew or should have known that the originally filed terminal disclaimer was defective and fatal to the application.

24. When the '902 patent issued without any indication of the limited term as mandated by the Patent and Trademark Office, no attempt was made by the applicant, assignee, patent attorney/agent, and/or others in interest to correct the defect even though they knew or should have known of the gross inaccuracy.

25. The applicant, assignee, patent attorney/agent, and/or others in interest intentionally failed to disclose and inform the Patent Office of material information, namely that an invalid terminal disclaimer had been filed and that the patent had mistakenly issued for the full 17 year term.

26. The applicant, assignee, patent attorney/agent, and/or others in interest knew that the original terminal disclaimer document was defective, that the patent application was invalid without a valid terminal disclaimer, and that the '902 patent should have indicated that it expired on December 13, 2000, and not on May 10, 2005.

27. The applicant, assignee, patent attorney/agent, and/or others in interest, by their said conduct have intentionally deceived the Patent and Trademark Office, those in the electronic digital caliper market, the general public, and plaintiff as to the life and validity of the 902 patent.

28. The '902 patent is void and unenforceable because the applicant, inventor, assignee, patent attorney/agent, and/or others in interest, breached their duty of candor to

the United States Patent and Trademark Office by their aforesaid conduct.

29. The '902 patent is void and unenforceable because it was procured by the said inequitable conduct of the applicant, inventor, assignee, patent attorney/agent, defendants and/or others in interest who have been reaping the benefits of the '902 patent without legitimate entitlement, to the detriment of the general public, plaintiff and others.

COUNT IV

Patent Unenforceability Because Of Ambiguous Claim Language

30. The claims of the '902 patent are functional, vague, and indefinite, are broader than the alleged invention as set forth in the specification, and do not particularly point out and distinctly claim the subject matter, which applicant regards as his alleged invention; and

WHEREFORE, plaintiff prays for judgment against defendants providing the following relief:

A. Declaring that the '902 patent and the claims thereof are invalid, void, and unenforceable;

B. Enjoining defendants from asserting the '902 patent against plaintiff, its representatives, agents, contractors, and customers, present and prospective;

C. Awarding plaintiff cost of suit and reasonable attorneys fees, and;

/ / /

D. Granting such other further relief as shall be just and proper.

Respectfully submitted,
CENTRAL PURCHASING, INC.
By its Attorneys

April 5, 1995
Date

Robert M. Wallace, Bar No. 078483
Richard T. Lyon, Bar No. 163010
Edmond A. DeFrank, Bar No. 168479
MICHAELSON & WALLACE
The Center Promenade
1001 Partridge Drive
Suite 330
Ventura, CA 93003
Telephone (805) 644-4035

EXHIBIT

3

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

CENTRAL PURCHASING, INC., Plaintiff, v. MITUTOYO CORPORATION and C.E. JOHANSSON AB, Defendants.	)	Civil Action No. 95-2292 (NHJ/PJA)

STIPULATED DISMISSAL OF AND ORDER
DISMISSING COUNT III OF THE AMENDED COMPLAINT

It is hereby stipulated by and between the parties as follows:

1. Count III of plaintiff's Amended Complaint, the claim of inequitable conduct, is hereby dismissed with prejudice, the parties noting that defendants filed a summary judgment motion covering Count III and plaintiff took discovery with respect to the merits of Count III. However, this dismissal of Count III shall not be construed to have any preclusionary effect on any of plaintiff's other claims as presently stated.

(N)

2. This stipulation shall not be construed to abridge or limit defendants' possible recovery for sanctions under Fed. R. Civ. P. 11 with respect to this Count, an award of attorney fees under 35 U.S.C. §285 with respect to this Count, or any other award of attorney fees or costs in this litigation.

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Darle M. Short (Bar No. 386237)
Paul T. Bowen
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Attorneys for Plaintiff
CENTRAL PURCHASING, INC.

So Ordered:

Norma Holloway Johnson
United States District Judge

Date: April 17, 1997

EXHIBIT

4

THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

CENTRAL PURCHASING, INC.,

Plaintiff,

v.

MITUTOYO CORPORATION, et al.,

Defendants.

Civil Action No. 95-2292 (NHJ)

ORDER

Presently before the Court are (1) Defendants' Motion for Summary Judgment that the Claims of U.S. Patent 4,743,902 are not Invalid under 35 U.S.C. § 102, (2) Defendants' Motion for Summary Judgment Dismissing Count II of the Amended Complaint, (3) Plaintiff's Cross-motion for Summary Judgment on Count II Declaring Defendants' Patent Invalid, and (4) Plaintiff's Motion for Summary Judgment that Claims 1 and 2 of U.S. Patent 4,743,902 are Invalid under 35 U.S.C. § 102. By order dated January 8, 1997, this Court referred these motions to a Special Master, Dale S. Lazar, Esq., pursuant to Federal Rule of Civil Procedure 53. On September 11, 1997, the Special Master issued a report entitled Special Master's Report and Recommendation Ruling on Pending Motions for Summary Judgment on Count I (Anticipation) and Count II (Uncontested Obviousness). Neither party filed objections to this report, but each party submitted a proposed order to implement the findings made in this report.

Upon consideration of this report, the parties' proposed orders for implementing this report, and the record herein, it is this 15th day of November, 1997,

ORDERED that the Special Master's Report and Recommendation Ruling on Pending

Motions for Summary Judgment on Count I (Anticipation) and Count II (Uncontested Obviousness) [#65] be, and hereby is, adopted by the Court and is thus a decision and order by the Court; it is further

ORDERED that Defendants' Motion for Summary Judgment that the Claims of U.S. Patent 4,743,902 are not Invalid under 35 U.S.C. § 102 [#21] and Defendants' Motion for Summary Judgment Dismissing Count II of the Amended Complaint [#22] be, and hereby are, granted, without prejudice to the continuation of claims of invalidity stated in paragraphs 13(g) and 13(h) of Count I of the First Amended Complaint; it is further

ORDERED that Plaintiff's Cross-motion for Summary Judgment on Count II Declaring Defendants' Patent Invalid [#31] and Plaintiff's Motion for Summary Judgment that Claims 1 and 2 of U.S. Patent 4,743,902 are Invalid under 35 U.S.C. § 102 [#28] be, and hereby are, denied; and it is further

ORDERED that paragraphs 13(a)-(f) and 14 of Count I of the First Amended Complaint and Count II of this Complaint be, and hereby are, dismissed with prejudice.

Norma Holloway Johnson

NORMA HOLLOWAY JOHNSON
UNITED STATES DISTRICT JUDGE

EXHIBIT

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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

CENTRAL PURCHASING, INC.,

Plaintiff,

v.

MITUTOYO CORPORATION, et al.,

Defendants.

Civil Action No. 95-2292 (NHJ)

ORDER

Presently before the Court is plaintiff's motion to dismiss with prejudice Paragraphs 13(g) and 13(h) of Count I (Unpatentability) and Count IV (Unenforceability) of its complaint. Defendants oppose the motion unless it is dismissed with the following conditions: 1) plaintiff is permanently enjoined from selling the disputed calipers for the life of United States Patent No. 4,743,902 ("Patent 902"); 2) the Court awards defendants their attorney's fees; and 3) the Court awards costs to defendants. Given that plaintiff has moved to dismiss with prejudice, the Court shall grant the motion and declines to impose conditions on the dismissal. See Smoot v. Fox, 340 F.2d 301, 303 (6th Cir. 1964) (finding that the district court abused its discretion by denying plaintiff's motion to dismiss with prejudice).

On March 29, 1995, plaintiff filed a complaint which consisted of four counts of patent invalidity and unenforceability. By order dated January 8, 1997, this Court referred motions for summary judgment with respect to Counts I and II to a Special Master, Dale S. Lazar, Esq., pursuant to Federal Rule of Civil Procedure (FRCP) 53. By stipulated order, the Court dismissed Count III (Inequitable Conduct) on April 17, 1997. On September 11, 1997, the Special Master issued a report recommending that summary judgment be entered in favor of

defendants with respect to Paragraphs 13(a) - (f) of Count I and Count II (Uncontested Obviousness). On November 25, 1997, the Court adopted the Special Master's recommendations and granted the summary judgment motions pertaining to Count I and Count II in favor of defendants.

Pursuant to FRCP 41(a)(2), the Court finds reason to grant plaintiff's motion to dismiss the remainder of its complaint with prejudice. The Court declines to grant the requested injunction, but notes that the dismissal of Count IV with prejudice precludes plaintiff from challenging the enforceability of Patent 902 in the future. Additionally, the Court fails to find "exceptional" circumstances necessary to permit an award of attorney's fees. See Oetiker v. Jurid Werke GmbH, 671 F.2d 596, 602 (D.C. Cir. 1982) (holding that 35 U.S.C. § 285 permits an award of attorney's fees in patent cases involving "exceptional" circumstances); see also Standard Oil Co. v. American Cyanamid Co., 774 F.2d 448, 455 (Fed. Cir. 1985) (finding that willful infringement, inequitable conduct, misconduct during litigation, vexatious or unjustified litigation, or a frivolous suit qualify as "exceptional" circumstances).

The Court declines to impose costs as a condition of the dismissal, but pursuant to FRCP 54(d)(1) will award costs to defendants as the prevailing parties. See Baez v. United States Dep't of Justice, 684 F.2d 999, 1004 (D.C. Cir. 1982) (stating that FRCP 54(d) creates a presumption that the district court will award costs to the prevailing party); Schwarz v. Folloder, 767 F.2d 125, 131 n.8 (5th Cir. 1985) (noting that the defendant is the "prevailing party" whether the plaintiff dismisses its case against the defendant with or without prejudice). The Clerk of Court shall determine the costs to be awarded to defendants and may assess costs provided for in 28 U.S.C. § 1920. See Aird v. Ford Motor Co., 86 F.3d 216, 220-21 (D.C. Cir. 1996).

The costs to be awarded to defendants shall also include defendants' portion of the Special Master's fees. Pursuant to FRCP 53(a), the Court may allocate special master's fees "in favor of the prevailing party." Aird, 86 F.3d at 221; see Apponi v. Sunshine Biscuits, Inc., 809 F.2d 1210, 1220 (6th Cir. 1987); Morgan v. Kerrigan, 530 F.2d 401, 427 (1st Cir. 1976). Although the Court's Order of Reference of January 18, 1997, directs that each side pay half of the Special Master's fees, the Court retains the discretion to modify allocation of the payment. See Aird, 86 F.3d at 221-22 (holding that a district court may treat special master's fees as taxable costs despite a previous order of reference that divided the fees between the parties). In light of defendants' prevailing status on the claims referred to the Special Master, the Court finds reason to include defendants' portion of the Special Master's fees in the calculation of costs to be paid by plaintiff to defendants. See Fed. R. Civ. P. 53(a); Fed. R. Civ. P. 54(d)(1); Aird, 86 F.3d at 221-22.

Upon consideration of the motion, the supporting and opposing memoranda, and the record herein, it is this 9th day of June 1998,

ORDERED that plaintiff's motion to dismiss with prejudice be, and hereby is, granted; it is further

ORDERED that plaintiff shall pay defendants' costs, including those provided for in 28 U.S.C. § 1920; it is further

ORDERED that the costs to be paid by plaintiff shall include defendants' portion of the Special Master's fees in the amount of $15,000.00; and it is further

ORDERED that the determination of the costs to be awarded to defendants be referred to the Clerk of Court.

Norma Holloway Johnson

NORMA HOLLOWAY JOHNSON
UNITED STATES DISTRICT JUDGE

EXHIBIT

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United States Court of Appeals for the Federal Circuit

99-1083

CENTRAL PURCHASING, INC.,

Plaintiff-Appellant,

v.

MITUTOYO CORPORATION and C.E. JOHANSSON AB,

Defendants-Appellees.

O R D E R

NOTE: Pursuant to Fed. Cir. R. 47.6, this order is not citable as precedent. It is a public record.

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

ORDER

The parties having so agreed, it is

ORDERED that the proceeding is DISMISSED under Fed. R. App. P. 42 (b).

FOR THE COURT,

Jan Horbaly
Clerk

06/14/99

cc: Clerk's Office, DCT
RICHARD A. ASH
JAMES A. OLIFF

FILED
U.S COURT OF APPEALS FOR
THE FEDERAL CIRCUIT

JUN 15 1999

JAN HORBALY
CLERK

ISSUED AS A MANDATE: 06/15/99

CENTRAL PURCHASING V MITUTOYO CORP, 99-1083
DCT - 95-CV-2292

EXHIBIT

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PHILIP D. FREEDMAN*

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MARY A. MONTEBELLO*
GARY R. DREW*
WILHLEM F. GADIANO
ALAN M. KAGEN
WILLIAM M. HIENZ III
KATHLEEN J. GALLAGHER*
DAVID J. ZIBELLI
DAVID C. OREN

OF COUNSEL
GEORGE A. MONTANYE
RICHARD A. BACHAND*

*BARS OTHER THAN VIRGINIA

94 APR 8 P3:04

March 29, 1994

BY COURIER

Mr. Ben Kirk
Central Purchasing Company
3491 Mission Oaks Boulevard
P.O. Box 3169
Camarillo, CA 93011-3169

Re: Electronic Digital Calipers from China
Our Ref.: JAO/MIT-22

Dear Mr. Kirk:

Confirming discussions with personnel of MTI Corporation, Central Purchasing Company has the following inventory of Chinese manufactured electronic digital calipers (which Mitutoyo Corporation believes infringe its rights in U.S. Patent No. 4743902):

Six inch calipers	-	2,000
Eight inch calipers	-	400
Twelve inch calipers	-	229
TOTAL		2,629 units

Mitutoyo Corporation agrees that Central Purchasing Company may dispose of the above inventory (primarily by filling back orders but also by other discreet means). Central Purchasing Company agrees that this inventory will be disposed of by June 30, 1994 and, further, that upon disposition of this inventory neither it nor any of its divisions or controlled corporations will import into the United Sates or market in this country any electronic digital caliper that infringes the rights of Mitutoyo Corporation in U.S. Patent No. 4743902.

Please signify the agreement of Central Purchasing Company to these terms by having Mr. Smidt sign this letter in the space below and returning it to us as soon as possible.

OLIFF & BERRIDGE

Thank you for your cooperation.

Very truly yours,

James A. Oliff

JAO/DLH:jrp

The above is agreed to:

Eric Smidt
For: Central Purchasing Company

cc: Robert M. Wallace, Esq.

JS 44 (Rev. 3/99)

CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

DOCKETED
FEB 12 2003

JUDGE JOAN H. LEFKOW

(a) **PLAINTIFFS** Mitutoyo Corporation, Mitutoyo America Corporation & C.E. Johansson AB

DEFENDANTS Central Purchasing

(b) County of Residence of First Listed Plaintiff _____ (EXCEPT IN U.S. PLAINTIFF CASES)

County of Residence of First Listed _____ (IN U.S. PLAINTIFF CASES ONLY)

NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF THE LAND INVOLVED.

(c) Attorney's (Firm Name, Address, and Telephone Number) Greer Burns & Crain, Ltd.

Attorneys (If Known)

03C 0990

MAGISTRATE JUDGE ASHMAN

FILED-ED
FEB 10 PM 4:
CLERK
U.S. DISTRICT COURT

II. BASIS OF JURISDICTION (Place an "X" in One Box Only)

- ☐ 1 U.S. Government Plaintiff
- ☐ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☒ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place an "X" in One Box for Plaintiff and One Box for Defendant)

(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business In This State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business In Another State	☒ 5	☒ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT (Place an "X" in One Box Only)

CONTRACT
- ☐ 110 Insurance
- ☐ 120 Marine
- ☐ 130 Miller Act
- ☐ 140 Negotiable Instrument
- ☐ 150 Recovery of Overpayment & Enforcement of Judgment
- ☐ 151 Medicare Act
- ☐ 152 Recovery of Defaulted Student Loans (Excl. Veterans)
- ☐ 153 Recovery of Overpayment of Veteran's Benefits
- ☐ 160 Stockholders' Suits
- ☐ 190 Other Contract
- ☐ 195 Contract Product Liability

REAL PROPERTY
- ☐ 210 Land Condemnation
- ☐ 220 Foreclosure
- ☐ 230 Rent Lease & Ejectment
- ☐ 240 Torts to Land
- ☐ 245 Tort Product Liability
- ☐ 290 All Other Real Property

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Inj.

PERSONAL INJURY
- ☐ 362 Personal Injury—Med. Malpractice
- ☐ 365 Personal Injury—Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

Habeas Corpus:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC
- ☐ 630 Liquor Laws
- ☐ 640 R.R. & Truck
- ☐ 650 Airline Regs.
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt. Relations
- ☐ 730 Labor/Mgmt.Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl. Ret. Inc. Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS—Third Party 26 USC 7609

OTHER STATUTES
- ☐ 400 State Reapportionment
- ☐ 410 Antitrust
- ☐ 430 Banks and Banking
- ☐ 450 Commerce/ICC Rates/etc.
- ☐ 460 Deportation
- ☐ 470 Racketeer Influenced and Corrupt Organizations
- ☐ 810 Selective Service
- ☐ 850 Securities/Commodities/ Exchange
- ☐ 875 Customer Challenge 12 USC 3410
- ☐ 891 Agricultural Acts
- ☐ 892 Economic Stabilization Act
- ☐ 893 Environmental Matters
- ☐ 894 Energy Allocation Act
- ☐ 895 Freedom of Information Act
- ☐ 900 Appeal of Fee-Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN (PLACE AN "X" IN ONE BOX ONLY)

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from Appellate Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION

(Cite the U.S. Civil Statute under which you are filing and write brief statement of cause. Do not cite jurisdictional statutes unless diversity.)

VII. REQUESTED IN COMPLAINT:

☐ CHECK IF THIS IS A CLASS ACTION UNDER F.R.C.P. 23

DEMAND $

CHECK YES only if demanded in complaint:
JURY DEMAND: ☐ Yes ☐ No

VIII. This case

☒ is not a refiling of a previously dismissed action.

☐ is a refiling of case _____, previously dismissed by Judge _____

DATE 2/10/03

SIGNATURE OF ATTORNEY OF RECORD Patrick Burns

1-2

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
Eastern Division

JUDGE JOAN H. LEFKOW
MAGISTRATE JUDGE ASHMAN

In the Matter of

MITUTOYO CORP. et al.

v.

CENTRAL PURCHASING, INC.

03C 0990 Case Number:

APPEARANCES ARE HEREBY FILED BY THE UNDERSIGNED AS ATTORNEY(S) FOR:

Mitutoyo Corp., Mitutoyo America Corp. and C.E. Johansson AB

(A)	(B)
SIGNATURE	SIGNATURE
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FIRM: Oliff & Berridge, PLC	FIRM: Greer, Burns & Crain, Ltd.
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CITY/STATE/ZIP: Alexandria, Virginia 22314	CITY/STATE/ZIP: Chicago, Illinois 60606
TELEPHONE NUMBER: (703) 836-6400	TELEPHONE NUMBER: (312) 360-0080
IDENTIFICATION NUMBER (SEE ITEM 4 ON REVERSE)	IDENTIFICATION NUMBER (SEE ITEM 4 ON REVERSE): 3122589
MEMBER OF TRIAL BAR? YES ☐ NO ☑	MEMBER OF TRIAL BAR? YES ☑ NO ☐
TRIAL ATTORNEY? YES ☑ NO ☐	TRIAL ATTORNEY? YES ☐ NO ☑
	DESIGNATED AS LOCAL COUNSEL? YES ☑ NO ☐

(C)	(D)
SIGNATURE	SIGNATURE
NAME: Steven P. Fallon	NAME: Thomas R. Fitzsimons
FIRM: Greer, Burns & Crain, Ltd.	FIRM: Greer, Burns & Crain, Ltd.
STREET ADDRESS: 300 South Wacker Drive, Suite 2500	STREET ADDRESS: 300 South Wacker Drive, Suite 2500
CITY/STATE/ZIP: Chicago, Illinois 60606	CITY/STATE/ZIP: Chicago, Illinois 60606
TELEPHONE NUMBER: (312) 360-0080	TELEPHONE NUMBER: (312) 360-0080
IDENTIFICATION NUMBER (SEE ITEM 4 ON REVERSE): 6226735	IDENTIFICATION NUMBER (SEE ITEM 4 ON REVERSE): 6224925
MEMBER OF TRIAL BAR? YES ☑ NO ☐	MEMBER OF TRIAL BAR? YES ☐ NO ☑
TRIAL ATTORNEY? YES ☐ NO ☑	TRIAL ATTORNEY? YES ☐ NO ☑
DESIGNATED AS LOCAL COUNSEL? YES ☑ NO ☐	DESIGNATED AS LOCAL COUNSEL? YES ☑ NO ☐

1-3